AMENDMENTS TO THE CLAIMS

1. **(Previously Presented)** An isolated polynucleotide having a nucleic acid sequence which is capable of hybridizing under high stringency conditions with the polynucleotide sequence of SEQ ID NO: 1, or its complementary strand, wherein said hybridizing occurs in a solution of 5 X SSC, 5 X Denhardt's solution, 0.5% SDS and 100 µg/ml of denatured sonicated salmon sperm DNA for 12 hours at approximately 45°C followed by washing twice for 30 minutes in 2 X SSC, 0.5% SDS at a temperature of at least 65°C, wherein said polynucleotide encodes an amino acid sequence which is a sub-unit of a KCNQ4 potassium channel and which, when joined with other subunits makes up a functional potassium channel.

2. **(Previously Presented)** The isolated polynucleotide according to claim 1, wherein said isolated polynucleotide is at least 90% homologous to the polynucleotide sequence of as SEQ ID NO: 1.

3. **(Previously Presented)** The isolated polynucleotide according claim 1, wherein said isolated polynucleotide is a cloned polynucleotide.

4. **(Previously Presented)** The isolated polynucleotide according to claim 3, wherein the polynucleotide is cloned from, or produced from a cDNA library.

5. **(Previously Presented)** The isolated polynucleotide according to claim 1, comprising the polynucleotide sequence presented as SEQ ID NO: 1.

6. **(Previously Presented)** The isolated polynucleotide according to claim 1, comprising the polynucleotide sequence of SEQ ID NO: 1, wherein said sequence includes a mutation G935A.

7. **(Canceled)**

~~7~~ 8. **(Previously Presented)** The isolated polynucleotide according to claim 1, encoding a KCNQ4 potassium channel subunit comprising the amino acid sequence of SEQ ID NO: 2.

9. **(Canceled)**

10. **(Canceled)**

~~8~~ ~~11.~~ **(Currently Amended)** The isolated polynucleotide according to claim 1, encoding a variant KCNQ4/G285S ~~or KCNQ4/G333S~~ when said polynucleotide is numbered according to ~~KCNQ1~~SEQ ID NO: 1.

12. **(WITHDRAWN)** An isolated polynucleotide comprising any one of the sequences of SEQ ID NOS: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, and 32.

13. **(WITHDRAWN)** A recombinantly produced polypeptide encoded by the polynucleotide according to claim 1.

14. **(WITHDRAWN)** The polypeptide according to claim 13, wherein said polypeptide is a KCNQ4 potassium channel subunit comprising the amino acid sequence of SEQ ID No. 2.

15. **(WITHDRAWN)** The polypeptide according to claim 13, wherein said polypeptide is a KCNQ4 variant, and wherein said variant has an amino acid sequence that has been changed by deletion of an amino acid residue, by insertion of an additional amino acid residue, or by substitution of an amino acid residue at one or more positions.

16. **(WITHDRAWN)** The polypeptide according to claim 15, wherein said variant has an amino acid sequence that has been changed at one or more positions located in a conserved region, wherein said region is defined by Table 1.

17. **(WITHDRAWN)** The polypeptide according to claim 15, wherein said polypeptide is the variant KCNQ4/G285S or. KCNQ4/G333S when said polypeptide is numbered according to KCNQ1.

9 ~~18~~. **(Previously Presented)** An isolated cell genetically manipulated by the incorporation of a heterologous polynucleotide according to claim 1.

10 ~~19~~. **(Previously Presented)** The cell according to claim 9 ~~18~~, genetically manipulated by the incorporation of a KCNQ4 channel subunit comprising the amino acid sequence of SEQ ID NO: 2.

20. **(Canceled)**

21. **(Canceled)**

11 ~~22~~. **(Currently Amended)** The cell according to claim 9 ~~18~~, genetically manipulated by the incorporation of the variant KCNQ4/G285S ~~or KCNQ4/G333S~~ when numbered according to ~~KCNQ1~~SEQ ID NO: 1.

12 ~~23~~. **(Previously Presented)** The cell according to claim 9 ~~18~~, wherein said cell co-expresses one or more KCNQ channel subunits.

13 ~~24~~. **(Previously Presented)** The cell according to claim 12 ~~23~~, wherein said cell co-expresses KCNQ4 and KCNQ1 channel subunits, KCNQ4 and KCNQ2 channel subunits, KCNQ4 and KCNQ3 channel subunits, KCNQ4 and KCNQ1 and KCNQ2 channel subunits, KCNQ4 and KCNQ1 and KCNQ3 channel subunits, KCNQ4 and KCNQ2 and KCNQ3 channel

subunits, or KCNQ4 and KCNQ1 and KCNQ2 and KCNQ3 channel subunits.

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25. **(Previously Presented)** The cell according to claim ~~23~~, wherein said cell co-expresses KCNQ3 and KCNQ4 channel subunits.

26. **(Canceled)**

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27. **(Previously Presented)** The cell according to claim ~~18~~, wherein said cell is a human embryonic kidney (HEK) cell, a HEK 293 cell, a BHK21 cell, a Chinese hamster ovary (CHO) cell, a *Xenopus laevis* oocyte (XLO) cell, a COS cell, or any other cell line that expresses KCNQ potassium channels.

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28. **(Currently Amended)** A membrane preparation derived from a cell according to claim ~~22~~ 21, and wherein said membrane preparation comprises said polypeptide encoded by said heterolgous polynucleotide sequence.

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29. **(Previously Presented)** A method for obtaining a substantially homogeneous source of a human potassium channel comprising a KCNQ4 subunit, comprising the steps of culturing a cellular host having incorporated expressly therein a polynucleotide according to claim 1, recovering the cultured cells and obtaining said human KCNQ4 subunit.

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30. **(Currently Amended)** The method of claim ~~29~~, further comprising the step of obtaining a membrane preparation from the cultured cells, and wherein said membrane preparation comprises said KCNQ4 subunit encoded by said polynucleotide sequence.

31. **(WITHDRAWN)** A method of detecting a chemical compound which binds to a potassium channel comprising at least one KCNQ4 channel subunit, comprising the steps of:

(i) subjecting a KCNQ4 channel subunit of a cell or a membrane preparation to the action of a KCNQ4 binding agent to form a complex;
(ii) subjecting the complex of step (i) to the action of the chemical compound to be tested; and
(iii) detecting the displacement of the KCNQ4 binding agent from the complex with the KCNQ4 channel subunit of the cell or membrane preparation.

32. **(WITHDRAWN)** The method of claim 31, wherein the cell containing the KCNQ4 channel subunit is a cell which is genetically manipulated by the incorporation of a heterologous polynucleotide having a nucleic acid sequence which is capable of hybridizing under high stringency conditions with the polynucleotide of SEQ ID NO.:1, its complimentary strand, or subsequence thereof..

33. **(WITHDRAWN)** The method of either of claims 31-32, in which the KCNQ4 binding agent is
radioactively labelled 1,3-dihydro-1-phenyl-3,3-bis(4-pyridylmethyl)-2H-indol-2-one (Linopirdine), or
radioactively labelled 10,10-bis(4-pyridinyl-methyl)-9(10H)-antracenone.

34. **(WITHDRAWN)** The method of claim 33, wherein said binding agents are radioactively labelled with ^{3}H.

35. **(WITHDRAWN)** The method of claim 33, wherein the displacement of the KCNQ4 binding agent from the complex with the KCNQ4 channel subunit cell is detected by measuring an amount of radioactivity by conventional liquid scintillation counting.

36. **(WITHDRAWN)** A method of screening a chemical compound for activity on a potassium channel comprising at least one KCNQ4 channel subunit, comprising the steps of

(i) subjecting a KCNQ4 channel subunit of a cell to the action of the chemical compound; and

(ii) monitoring the membrane potential, the current, the potassium flux, or the secondary calcium influx of the KCNQ4 channel subunit of said cell.

37. **(WITHDRAWN)** The method of claim 36, wherein said cell is a cell according to claim 18.

38. **(WITHDRAWN)** The method claim 36, wherein monitoring of the membrane potential is performed by patch clamp techniques.

39. **(WITHDRAWN)** The method claim 36, wherein monitoring of the membrane potential is performed by fluorescence methods.

40. **(WITHDRAWN)** A chemical compound identified by the method of claim 3.

41. **(WITHDRAWN)** A method of diagnosis, treatment, prevention or alleviation of diseases related to tinnitus, loss of hearing, progressive hearing loss, neonatal deafness, and presbyacusis, diseases or adverse conditions of the CNS, affective disorders, Alzheimer's disease, anxiety, ataxia, CNS damage caused by trauma, stroke or neurodegenerative illness, cognitive deficits, compulsive behavior, dementia, depression, Huntington's disease, mania, memory impairment, memory disorders, memory dysfunction, motion disorders, motor disorders, neurodegenerative diseases, Parkinson's disease and Parkinson-like motor disorders, phobias, Pick's disease, psychosis, schizophrenia, spinal cord damage, stroke, and tremor comprising the step of:

using a chemical compound of claim 40.

42. **(WITHDRAWN)** The method according to claim 41, wherein the chemical compound is 1,3-dihydro-1-phenyl-3,3-bis(4-pyridylmethyl)-2H-indol-2-one (Linopirdine), or 10,10-bis(4-pyridinyl-methyl)-9(10H)-antracenone.

43. **(WITHDRAWN)** A method for screening genetic materials of individuals comprising: contacting a polynucleotide of claim 1 to said genetic material; and detecting hybridisation of said polynucleotide to said genetic material.

44. **(WITHDRAWN)** A transgenic animal comprising a knock-out mutation of the endogenous *KCNQ4* gene or a mutated *KCNQ4* gene.

45. **(WITHDRAWN)** The transgenic animal according to claim 44, wherein said knock-out is in a homozygous state.

46. **(Canceled)**

47. **(WITHDRAWN)** The transgenic animal according to claim 44, wherein said transgenic animal is a transgenic rodent, in particular a hamster, a guinea pig, a rabbit, or a rat, a transgenic pig, a transgenic cattle, a transgenic sheep, or a transgenic goat.

48. **(Canceled)**

49. **(WITHDRAWN)** A method to screen for drugs affecting diseases or conditions associated with hearing loss or tinnitus, comprising injecting a transgenic animal of claim 44 with a therapeutic compound.

50. **(WITHDRAWN)** A method for the identifying, localizing, isolatng or amplifiying a polynucleotide comprising using a

polynucleotide according to claim 12 as a primer or a probe.

51. **(WITHDRAWN)** An antibody capable of binding one or more polypeptides according to claim 13.

52. **(WITHDRAWN)** The antibody of claim 51 wherein said antibody is a monoclonal antibody.

53. **(WITHDRAWN)** The method of claim 31, wherein a membrane preparation is used.

54. **(WITHDRAWN)** A chemical compound identified by the method of claim 36.

55. **(WITHDRAWN)** A method of diagnosis, treatment, prevention or alleviation of diseases related to tinnitus, loss of hearing, progressive hearing loss, neonatal deafness, and presbyacusis, diseases of adverse conditions of the CNS, affective disorders, Alzheimer's disease, anxiety, ataxia, CNS damage caused by trauma, stroke or neurodegenerative illness, cognitive deficits, compulsive behavior, dementia, depression, Huntington's disease, mania, memory impairment, memory disorders, memory dysfunction, motion disorders, motor disorders, neurodegenerative diseases, Parkinson's disease and Parkinson-like motor disorders, phobias, Pick's disease, psychosis, schizophrenia, spinal cord damage, stroke, and tremor comprising the step of:

using a chemical compound of claim 54.

56. **(WITHDRAWN)** The method according to claim 55, wherein the

chemical compound is 1,3-dihydro-1-phenyl-3,3-bis(4-pyridylmethyl)-2H-indol-2-one (Linopirdine), or 10-10-bis(4-pyridinyl-methyl)-9(10H)-antracenone.

57. **(WITHDRAWN)** A transgenic animal that overexpresses a KCNQ4 gene or a mutated KCNQ4 gene.

58. **(WITHDRAWN)** The transgenic animal according to claim 57, wherein said transgenic animal is a transgenic rodent, in particular a hamster, a guinea pig, a rabbit, or a rat, a transgenic pig, a transgenic cattle, a transgenic sheep, or a transgenic goat.

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59. **(Previously Presented)** A cell line genetically manipulated by the incorporation of a heterologous polynucleotide according to claim 1, wherein the polypeptide encoded by said heterologous polynucleotide is incorporated into the cell membrane.

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60. **(Previously Presented)** The isolated polynucleotide according to claim 2, wherein said isolated polynucleotide is at least 95% homologous to the polynucleotide sequence of SEQ ID NO:1.

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61. **(Previously Presented)** The isolated polynucleotide according to claim 1, wherein said nucleic acid sequences capable of hybridizing under high stringency conditions with the polynucleotide sequence of SEQ ID NO:1 or its complimentary strand, wherein said hybridizing occurs in a solution of 5 x SSC, 5 x Denhardt's solution, 0.5% SDS and 100 μg/ml of

denatured sonicated salmon sperm DNA for 12 hours at approximately 45°C followed by washing twice for 30 minutes in 2 x SSC, 0.5% SDS at a temperature of at least 70°C.

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~~62~~. **(Previously Presented)** The isolated cell of claim ~~18~~, wherein the polypeptide encoded by said heterologous polynucleotide is incorporated into the cell membrane.

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~~63~~. **(New)** The membrane preparation according to claim ~~62~~, and wherein said membrane preparation comprises the polypeptide sequence of SEQ ID NO: 2.

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~~64~~. **(New)** The method of claim ~~29~~, further comprising the step of obtaining a membrane preparation from the cultured cells, and wherein said membrane preparation comprises the polypeptide sequence of SEQ ID NO: 2.